

IT-enabled International Promotion Of Technology Transfer in the Enterprise Resource Planning Space

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Abstract: Too many companies fail in utilizing modern information technology (IT) tools for the international promotion (IP) of technology transfer. In fact, there exists no framework for, and nearly no empirical research of, the use of computer-based media for the IP of technology transfer. However, effective marketing systems are essential for making sales and surviving in the current intensely competitive global marketplace. It is our aim to study how hi-tech companies can contribute to the international electronic promotion (IEP) process and to develop an advanced IEP methodology which integrates ERP (enterprise resource planning) and other new ITs. This IEP methodology is based on several case studies of the innovative IP approach currently used by hi-tech companies in their technology transfer driven internationalization process. It is also based on an analysis of the characteristics of the technology, a literature review, interviews of practitioners, and interviews of researchers in an international technology transfer (ITT) research group. Our methodology provides several benefits to companies, e.g. customers' increased awareness of them and their market offerings on the foreign markets, rapid generation of leads, faster and easier sales, decrease in promotional expenses, new market openings, and internationalization through IT-enabled promotion of ITT.

Keywords: International Technology Transfer, Information Technology, Enterprise Resource Planning, Conventional International Promotion Approach, International Electronic Promotion Approach, Global Electronic Environment, Internationalization, Hi-Tech Companies

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1. Background, Research Motivation and Research Problem

Currently, hi-tech companies' technology life cycles are rapidly shortening, because these companies invest a relatively high percentage of their turnover in R&D on a continuous basis and other factors. Companies are rapidly introducing more new products and services to Western markets.

Markets in the industrialized countries are saturated and competitive. Competition is intensifying further due to liberalization of trade through GATT agreements, involvement of new global companies from new industrialized countries and other factors. Consequently, companies are now facing competition on their domestic markets and are going to face more intense competition in the future. However, hi-tech companies are important for the economy as they create innovations and provide jobs for many people [18, 19, 20].

In the current era of liberalization, deregulation and globalization, hi-tech companies from

advanced industrialized countries have the possibilities to enter growing affluent markets of newly industrialized countries and developing countries or to seek low cost skilled labor, raw material, and other production inputs through technology transfer. According to Nahar [16, 18] technology transfer refers to a process of various activities where the technology is communicated and transmitted by the supplier to the receiver across the national border to enhance the capability of the receiver. Technology refers to applied scientific knowledge and skills, which facilitate the manufacturing of products or producing of the services.

Increasingly, international technology transfer (ITT) is becoming very important since successful ITT can offer several benefits to the technology supplier, technology supplying country, technology receiver and technology receiving country.

Through the transfer of technology, a supplier can obtain access to foreign markets and thereby overcome market entry barriers, extend technology life cycle, recover R&D expenses, utilize irrelevant technologies which have accidentally developed from R&D, acquire knowledge of foreign markets, create profits and achieve long-term growth and survival [1, 3, 16, 18, 19]. ITT allows companies more flexibility in utilizing their technological strengths and dealing with increasingly competitive and changing international business environment.

Effective international promotion (IP) is essential in order to inform prospective foreign recipients of the availability of the technology, and to persuade them to opt for the technology-marketer's offer. IP includes the techniques for communication with overseas customers and potential customers in order to facilitate the sale of products and/or services and/or technology for technology transfer. Due to complex and intangible nature of the technology, different needs of prospective recipients, a very high amount of customized information should be delivered to the prospective technology recipients. It is very expensive to make IP to deliver a huge amount of information to prospective recipients as it is quite slow as well. In addition, traditional tools are not interactive to deliver customized information. Consequently, effective IP using conventional promotional tools is expensive and not affordable for several companies. Therefore, most of the companies cannot participate in

promotion of ITT and are unable to obtain the benefits of successful ITT.

Enterprise resource planning (ERP) and other new information technologies (ITs) such as agent technology, multimedia-Web, Extranet, conferencing technology, etc. could be useful for promoting technology globally.

More and more leading companies around the world are adopting ERP [6, 8] due to the high benefits from successful implementation of ERP as well as to various factors positively influencing the adoption of ERP. ERP systems give them the opportunity to redesign, improve or standardize their business processes. Some companies are able to launch a new business model or business stream in a shorter span of time. Some companies have benefited significantly in terms of operational efficiencies and effectiveness. They also have the ability to put data into the managers' hands so that they have the information necessary for making real-time business decisions more accurately. This enables them to react more quickly to rapidly changing business environment, resulting in a *more flexible* operation. It increases the productivity of technical support staff, facilitates cost savings in salary administration. It facilitates order entry and shipping, increase in sales without increasing the number of manufacturing workers. It served to avoid high upgrading costs for Y2K and also doing the same with the Euro.

However, companies face various challenges in their implementation of ERP systems [6, 8] such as changing existing applications in the company, changing the mind-set from the traditional way of doing business, finding qualified ERP people and so on. Companies are overcoming the challenges by adopting various strategies, such as the participation of end users in the project, effective management support, effective change management, giving specialized training to both technical people and business users and so on.

It has been proven that successful implementation of ERP systems can improve the organization and human resource management, business planning and controlling, procurement, production, inventory management, order processing, accounting and capital asset management [6]. But no research has been undertaken how ERP could improve IP for TT, and therefore the current study is important.

Also the advent of an interactive multimedia-Web, conferencing technology, and other IT tools and services, explosive global growth of Internet; improvement of digitization technology for the integration of picture, voice, data and text; and an increasingly more powerful and broad range of ITs offered at lower costs [16, 18] could revolutionize the ways technology is promoted globally. The Internet has revolutionized the ways products and services are marketed [5, 9, 10]. The Internet can be useful for performing international marketing [23]. The Internet and Extranet can eliminate barriers of distance, time and geography and can facilitate worldwide communication, coordination and collaboration [17, 18]. The worldwide explosive growth of the Internet is increasing the potential of international electronic promotion (IEP).

IEP has the ability to reach the enterprise's customers on a global scale, and it could be effective and inexpensive. IEP refers to promotion through computer-based media utilizing new ITs in the global electronic environment. The innovative uses of a variety of IT tools in IP may provide benefits to companies and facilitate technology transfer.

Unfortunately, for several reasons, companies are failing to utilize these IT tools for the international promotion of technology transfer. Firstly, there is currently no existing framework for the use of computer-based media for the IP of technology transfer. There has also been a limited amount of empirical research undertaken to determine how companies can execute IEP for technology transfer. Secondly, limited knowledge and experience in the use of IT tools for IP, difficulties in building trust, the different cultures of the Internet community, rapid changes in ITs and other factors are making it very difficult for companies to use IT tools successfully for IP. This research has been undertaken to develop the framework for IEP of technology transfer that can successfully facilitate international promotion, contribute new knowledge and make advancements on existing knowledge of IEP.

The main research problem of this study is to establish how hi-tech companies can execute international promotion more effectively and efficiently using ITs. This study focuses on the promotion of market offerings. To maintain a clear focus in this study, the following boundaries have been set:

- The study deals only with IT-enabled international promotion of market offerings.

- The investigation has been restricted here to those ITs, which have the potential to make a large contribution to the IEP process.

This paper consists of nine major Sections. Section 2 presents the characteristics of technology. Section 3 describes the conventional promotional approach and its tools. Section 4 presents the research framework, which describes the IT tools that could make IP cost efficient for technology transfer. The methodology applied in this research is described in Section 5. Case companies are examined in Section 6. They are an electricity producer, a paper machine manufacturer, a paper and pulp technology supplier and an elevator-escalator manufacturer. In this Section, we examine how hi-tech companies are conducting international promotion for their technology transfer endeavors. Section 7 develops an IT-enabled IP process model for technology transfer in the context of hi-tech companies. The implementations of this model and the substitute IT tools of conventional promotion approach are also described in this Section. Section 8 presents the causes of failure in IEP. In Section 9, conclusions are drawn and implications of the research are discussed.

2. Characteristics of Technology

Analysis of the characteristics of transferred technology can lead us to find out how far information technologies can be utilized to promote ITT.

On the basis of various scientists' [1, 4, 11, 24] views and of our research on technology transfer, this study conceptualizes technology as systematic applied knowledge, skills and competencies of individual, team or organization that enable designing products and/or services innovatively, producing them efficiently, bringing products and/or services to market quickly, solving practical problems and so on.

Technology is mostly intangible in nature from the perspective of technology transfer. It is mainly embodied in design, documents, and in human being as know-how. Usually technology is dynamic and complex. A complex technology requires greater efforts and resources, and longer time to promote effectively by utilizing traditional promotional tools.

ITT is a complex process of several interlinked and overlapping phases. Usually through the

ITT process, the technology supplier interacts with the technology receiver, information flows in both directions, the technology is transferred to the receiver using various training methods [18]. The technology supplier transfers knowledge and skills to the people of the technology receiving company. People from both sides need to maintain close interrelationships and two-way communication.

IT tools are interactive and capable of delivering a very high amount of customized information faster and cheaper than traditional promotional tools. IT tools could be useful for promoting complex technology globally.

3. Conventional Promotional Approach and Tools

A review of the current literature and empirical studies suggest that companies in the industrialized countries are commonly utilizing some of the following conventional promotional tools for internationalization through technology transfer (see Figure 1). The companies use these tools to create awareness of market offerings, provide information about market offerings, influence customer's buying decision and so on.

The existing literature review [7, 17] reveals that the following conventional promotional tools are used by companies to promote their market offerings on foreign markets.

3.1 International Direct Mail

Direct mail campaigns require extensive market research, in-depth planning of material and highly systematic mailing [7]. Generally, it is difficult to obtain the required information for direct mail if the target customers are outside the North American and Western European markets. It is very expensive to send a huge amount of technology related information to several prospective technology recipients from foreign countries.

3.2 Trade Show

At a trade show, hundreds or even thousands of enterprises from different countries exhibit their market offerings. Participation in trade shows requires a lot of logistical and other planning, for example, shipping products to the show, unpacking and installation efforts. After the show, the stands have to be dismantled, packed and return freight arrangements should be made. These are very expensive and time consuming and in addition, specialized staff are needed to obtain benefits from the trade show. Technology is complex, one person or few people cannot provide all the information to the inquiries of the trade show visitors. It is not feasible for the technology supplier to send a group of people to the trade show, who combined can answer to the questions of the trade show visitors.

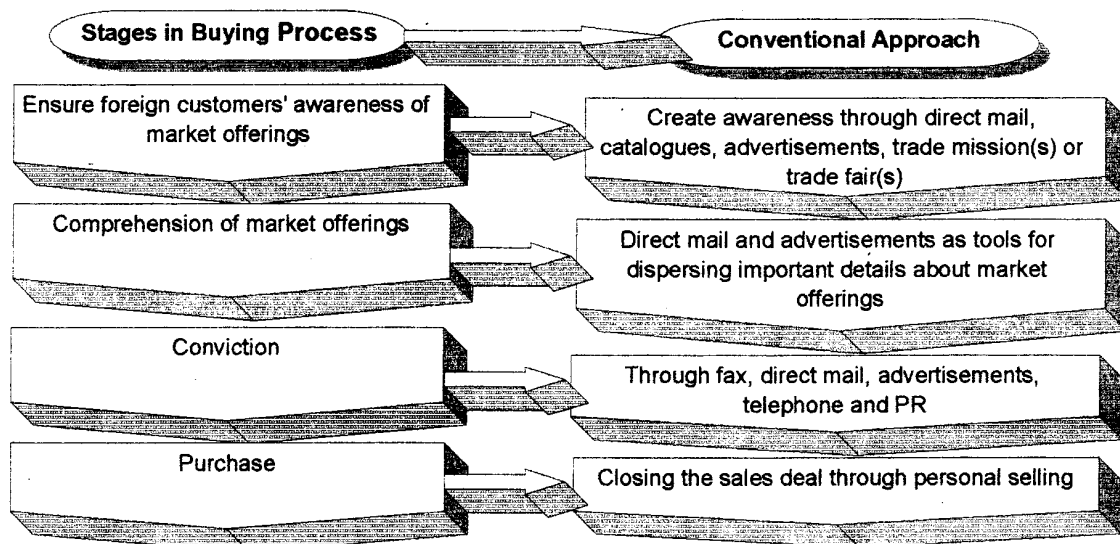


Figure 1. Conventional International Promotion Approach of TT

3.3 International Advertising

The companies identify the target audience and print advertisements in business and trade journals for a set fee. To get benefits from printed advertisements, large financial resources are required, which is generally beyond what companies can afford. It is almost impossible to deliver a very high amount of technology related information to several prospective technology recipients to foreign countries through international advertising due to the limited capacity of traditional media.

3.4 Public Relations

Public relations are the non-personal, free favorable representations of market offerings. Public relations build high credibility, but it requires specialized expertise, which few companies possess or can afford. Public relations may not be suitable to deliver a very large amount of technology related information.

3.5 Trade Mission

A trade mission is a planned visit of a group to potential buyers abroad under the supervision of an experienced leader. The businessman can identify customer needs and preferences, obtain an understanding of the different culture and view the country as a possible market for his/her enterprise. However, participating in trade missions is both expensive and time consuming.

3.6 International Personal Selling

In this case, the sales person travels to a foreign country and presents market offerings to the potential customer in order to make sales. However, personal selling is very expensive, time consuming and requires high motivation and skills from the sales person. The sales person should have a high ability to adapt to the customers and the situation. S/he should have an in-depth knowledge of the different aspects of the foreign culture, including aesthetics, religion, education, language, social organization and political factors.

This study determines that conventional promotional tools have limited capacity to deliver a very high amount of technology related information to several prospective technology recipients in foreign countries, they are not interactive to deliver customized

information, and they are very expensive if to make IP deliver a huge amount of information to prospective recipients. They are also very slow when compared to electronic/online promotion.

4. Research Framework

This study focuses mainly on the key points of major IT tools that could make IP cost efficient. Our investigation has been restricted here to those that have the potential to make large contributions to IP. Currently search engine submission of Web pages, solicited e-mail and promotion of the Web page in traditional media are the most effective promotional methods for generating sales and banner advertisement is useful for developing brand names. There are several other high-potential electronic tools as well.

4.1 E-mail

E-mail is the most commonly used Internet tool, allowing communication with people around the world at very low cost. Communicating via e-mail is one of the most important marketing tools used in international business today [14]. It can be used for providing information on an enterprise's market offerings as well as for receiving customer feedback, orders, etc. E-mail should be used cautiously with purpose in order to achieve benefits. Enterprises should not abuse e-mail, as it contradicts with the Internet culture.

Through market research enterprises could identify their potential customers. Enterprises could then delicately present special benefits to those prospective customers who are willing to receive the enterprises' e-mail. Enterprises could effectively communicate with those who respond positively. Effective and intensive e-mail communication could make foreign customers aware of market offerings, deliver information, make audience feel comfortable with market offerings, generate sales and perform follow up services.

4.2 Video Mail

Modern ITs allow users to produce their own video mail. Short digital movies with audio in ultra-compressed files can be transferred with e-mail messages through the Internet around the world. They work with all commonly used e-

mail software. They enable the creation of personalized e-mail messages that enhance the quality of business communications. Enterprises could send video clips about a new market offering to prospective foreign customers. They could record and send business proposals and presentations in multimedia format, which is better than ordinary mail and e-mail.

4.3 Enterprise Resource Planning (ERP)

An enterprise resource planning system is a packaged business software system that lets a company automate and integrate the majority of its business processes, share common data and practices across the enterprise and produce and access information in a real-time environment.

An ERP system may include software for human resources, purchasing, transportation, warehousing, manufacturing, order entry, accounts receivable, account payable, etc. ERP systems can improve organization and human resource management, business planning and controlling, procurement, production, inventory management, order processing, accounting and capital asset management [6].

ERP enables business processes to be restructured. ERP could also make a high contribution to the international promotion process by producing catalogues and letting outsiders see them through the Internet, letting the customers check the inventory through the Internet, and by order processing. Customers around the world could go through the catalogue 24 hours a day, check the available inventory in real time, and process the order instantly. This would be of huge convenience to customers. The company could reach global customers at a low cost, offer its market offerings and inventory 24 hours a day, and make the sales process automated and highly cost efficient.

4.4 Multimedia Web

A pervasive Internet tool which allows multimedia presentations, indexes, and text-search capacities. A company has the opportunity to simultaneously reach technology recipients around the world at minimum cost through its multilingual Web pages [14]. Technology recipients from developing countries in Asia, South and Central America and Africa can be reached using English, Spanish and French language Web pages. Enterprises in these countries are more willing

to visit their own language Web sites and get information in their local language. Without translation, technology recipients from non-English speaking origins may avoid a given site. The most important information in the Web pages could be translated into those languages whose markets have been identified as important. Web sites should provide ease of navigation and access to an enterprise's market offerings, relevant and adequate information on solutions to technology problems for the technology recipients. The language content and visuality can be developed according to the local culture.

When potential customers visit the Web site, customers could be allowed to make inquiries in their own languages, as most of these Web visitors do not write English well. Automatic translator software could translate the inquiries into English, and a quick reply can be given. Automatic translation is not as good as that done by a professional translator, but it serves its purpose.

The detailed Web page could be in English; there could be information on the market offering and its benefits, risk free buying, an order form or technology requirements form, a feedback form, the e-mail address, telephone, and fax number of the enterprise. The Web should be updated regularly and the information organized for easy location. Web should be integrated with enterprise's marketing strategy and overall business strategy [14]. A Web site which contains high quality information relevant to technology transfer from industrialized countries to developing countries could be developed. Such information is important for the technology recipients.

There are millions of Web pages, and technology suppliers are failing to distinguish their Web sites from these millions of Web pages and present them effectively. One solution is the submission of Web pages to overseas search engines and indexes. In addition, the use of electronic promotional tools, for example, software agents, mailing lists, electronic magazines and publishing the home page address in traditional media will create awareness of the technology amongst technology recipients.

4.5 Extranet

The Extranet is an Intranet open to selective access from outside the organization. The Extranet represents networks that extend

beyond a single enterprise to multiple organizations that must collaborate, communicate and exchange documents in order to achieve joint goals [2]. The Extranet's external features allow enterprises to reach current and potential global customers. It facilitates better access to information on market offerings, better and quicker solutions to problems through information and troubleshooting. Its graphic representation can allow users to understand how market offerings can provide high benefits to customers. The Extranet can also represent the features and benefits of new market offerings to customers. Especially, the existing customers can participate in conferencing in the Extranet where security and privacy are ensured.

4.6 Electronic Press Release (EPR)

The Internet and video mail have enabled easier and faster distribution of enterprises' press releases to Web magazines, newsgroups, archives, radio, television, newspapers and magazines around the world and lists of places for target distribution are available on the Web.

4.7 Electronic Exhibition/Virtual Trade Fair

The electronic exhibition is a new innovation in the use of Web technology and other ITs for international trade fairs, where thousands of enterprises from different countries can exhibit market offerings. Exhibitors can reach to their target foreign clients 24 hours per day all year, providing new business opportunities which are not possible through the conventional trade fair. In a virtual exhibition, needs of travelling, shipping goods, customs clearance, installing the wares at the exhibition site, dismantling, repackaging, and reshipping are eliminated, thus the associated problems are avoided. An electronic exhibition is more time and cost efficient than the traditional exhibition.

4.8 Teleconferencing

Teleconferencing allows a company to engage in real-time chat or asynchronous, threaded discussions with potential and present customers around the world [19]. This adds value to the company's market offerings, boosts its credibility and visibility, and enhances customer loyalty. To launch teleconferencing

requires moderate hardware and software and visitors need only their regular browsers.

4.9 Videoconferencing

Videoconferencing provides an enterprise with the capacity to demonstrate its market offerings and stimulate the desire for quick purchasing; to hold remote business meetings; and to rapidly solve the problems of potential and present customers around the world [14, 15, 22]. The major strength of videoconferencing is the ability to give an adequate amount of effective information in a very short period of time. An enterprise can use videoconferencing to collaborate with customers globally. Currently video conferencing is not widely used due to limited bandwidth and high price of high quality video conferencing hard wares and software.

4.10 Banner Advertising

A banner is a digital image of an enterprise's market offerings on the Internet. Banners can target global customers by geographic location, domain (com, gov, edu, etc.), operating system, generate leads, and build enterprise brands. When a customer clicks on a banner s/he is at once on the enterprise's Web site. Creative and attractive presentations and frequent changes are essential in order to increase the traffic flow. The enterprise should translate the text of banner advertisements into the local languages of the targeted countries in order to increase click-through rates.

The weakness of banner advertising is the huge budget that is required in order to make a banner campaign effective. In order to avoid the problem of large budgets for banners, banner exchanges could be arranged with well-promoted and highly popular sites

There are other IT tools such as DVD, Internet robot, IRC, MUD, mailing list, newsgroups, e-digest, e-zine, autoresponders and signature files that could improve the IP process.

5. Field Study

5.1 Research Design and Method

The goal of our field study was to identify how hi-tech companies conduct international promotion of their ITT endeavors. The research

framework and relevant literature review guided us in formulating the field study.

The qualitative case study approach is an appropriate method when little is known about a particular phenomenon with the objective of identifying theoretical constructs and developing theory. This research uses a multiple-case [25] design in order to ensure that the generalization of the emerging theory extends beyond that offered by a single case. Single-case research imposes limitations and is subject to possible bias. Multiple cases increase the potential for external validity and alert the researcher to bias, such as misjudging the representation of a single event.

The study focused on hi-tech companies in Finland which have transferred technology to developing countries. The case companies were selected from different industrial sectors and organizations. The selection of case companies was determined by the following considerations: suppliers of technologies who are involved in hi-tech areas and have transferred technology to developing countries; those companies who were knowledgeable and were willing to share their knowledge, opinions and insights.

The informants for this study were those who were directly involved in technology management and persons involved in the actual process of transferring technology. The interviews were conducted in two stages. The initial interviews were open-ended, allowing free description of the interviewee's area of responsibility and relationship to the technology transferred. The questions asked included:

1. Which conventional international promotion (IP) tools (i.e. direct mail, international advertising, trade mission, etc.) are the companies currently using to promote ITT and what are their functions, advantages and disadvantages?
2. Which ITs (i.e. WWW, autoresponder, signature file, mailing list, newsgroup, etc.) can make high contributions to IP, what are their strengths and weaknesses; how should the weaknesses be avoided?
3. What are the causes of failure in electronic IP?

4. What constitutes an effective and efficient IT-enabled international promotion process model and how should it be implemented?

5. What strategies should companies adopt to obtain great benefits from electronic IP?

This gave us the necessary data for designing a more focused interview guide at the second stage. Each interview took about two hours. At least six people were interviewed from each company, and in some companies the number of interviews was more than ten.

Data reduction of all interviews started immediately after the transcription of the tape-recorded interviews; this helped to bring the raw data into a summarized and thus manageable form. The transcription was checked and corrected. During the second stage of the interview, comparisons were made at various levels, for example: comparisons between informants at the company level, and comparisons between companies' experience.

The guidelines on qualitative data analysis presented in the literature [12, 13, 21] were helpful in analyzing the research data. This study followed the following steps suggested by Miles and Huberman [13]: data reduction; data display; and conclusion drawing or verification.

The resulting case report was classified into number of themes by using the research framework. These themes were summarized into a pattern by using a content analysis method [13, 21].

In this research, several measures were applied in the following ways: question guides were verified by case companies and various experts; data verification was attempted by putting the same questions to several employees in one organization, as well as by collecting secondary data for the same questions and verifying them.

6. Case Companies

6.1 An Electricity Producer

In this study, the real names of the companies have been altered for reasons of confidentiality.

A large Finnish Energy Company (FEC) relentlessly upgrades its technology through intensive R&D efforts and has developed

technology for operation and maintenance (O&M) of power stations. It uses advanced information technology in its R&D efforts and other aspects of business operations. By continually upgrading its technology, the company stays ahead of competitors.

It has transferred O&M technology to several advanced industrialized countries as well as developing countries. The company uses ERP, Web, e-mail, videoconferencing technology and other ITs to execute its global electronic marketing communication. By investigating internal databases, and energy related market databases (external), and CD with market data, the company identified South East Asia as an attractive market. Due to deregulation and privatization, the demand for O&M technology has increased in South East Asian (SEA) countries and other parts of the world. FEC made a feasibility study of the potential in SEA markets and wanted to enter SEA markets by transferring its O&M technology.

FEC used company-related databases to investigate prospective technology recipients. It identified a prospective technology recipient with high financial solvency and made preliminary negotiations by telephone, fax and face-to-face meetings. Finally, it negotiated a technology transfer contract with a technology recipient in Malaysia and made several agreements with the recipient, one of which specifies FEC's sole and total responsibility for managing the operation of the power plant. Due to the underdevelopment of IT in the Malaysian company at that time, FEC has not been able to use IT to the fullest potential for electronic market communication.

It supplied O&M technology which combines information systems, procedures and problem-solving expertise. The technology is unique, complex and partially legally protected. Some parts of the technology are tacit, not completely documented or codified and not legally protected.

The technology was transmitted through the provision of documents and intensive training. In Finland it provided for theoretical training supported by simulators to a few of the employees from the technology recipient. In addition, Finnish experts were sent to Malaysia to provide training. The plant came into operation at the beginning of 1995. The plant sells electricity to private companies. Transfer of technology has offered the recipient power, cost efficiency in operation and maintenance,

safety and a minimum risk of unexpected power plant failures.

The survival and profitability of the technology receiving enterprise is dependent on FEC's technology. Through intensive R&D, FEC remains at the forefront in technological development. It continuously improves the quality of the services that it offers to the technology recipients.

Through the continuous development of technology, the creation of highly advanced performance-monitoring systems, and participation in operations, FEC has been able to make the ITT effective. Furthermore, the experience of the technology supplier and the quality of technical and management education for recipient employees has made the project successful.

Currently, FEC is using several IT tools for global marketing communications such as ERP, company databases, CD-ROM, e-mail, the Internet, teleconferencing, mailing lists and newsgroups.

6.2 A Paper Machine Manufacturer

A Finnish Paper Machine Manufacturer's (FPM) heavy, continuous investment in R&D has made it one of the world leaders in paper machine manufacturing technology. The company has paper machine production plants in Finland and has transferred technology to advanced industrialized countries as well as to developing countries.

Paper machine manufacturing is a mature industry in the industrialized countries. The company uses ERP, Web, e-mail, CD-ROM, newsgroup and videoconferencing technology to execute its global electronic marketing communication. By investigating internal databases, and market databases (external), and CD with market data, the company identified China as an attractive market. Due to economic reform, the Chinese economy has been performing quite well and China is a huge, potential market for small and medium-sized paper machines. However, small and medium-sized paper machines are not manufactured in the industrialized countries because of the diminishing demand. FPM wanted access to the Chinese market in order to satisfy local demands, utilize cheaper inputs and export to nearby markets.

FPMM utilized company-related databases in order to identify prospective technology recipients. It identified and met a Chinese manufacturer of paper machines in 1987, made a feasibility study and began negotiations. The company used telephone, fax and face-to-face meetings for the preliminary negotiations. Finally, the company established a JV with the Chinese partner in 1989. The Chinese partner has long been involved in paper machine manufacturing.

FPMM carefully selected the technology to be transferred considering the needs of the technology recipient and prevailing conditions in China. It supplied paper machine manufacturing technology, quality control know-how, management know-how and marketing know-how.

The paper manufacturing technology that FPMM transferred to China had matured in Finland, but was very suitable for the Chinese market. FPMM adapted the technology. A very large percentage of the technology was tacit.

FPMM provided training by Finnish experts in technical, managerial and marketing areas to local Chinese employees in China. Chinese employees also traveled to Finland for training in the Finnish business style.

Technology was transmitted through the provision of documents and intensive training. Weak technology protection laws, low standards in the existing Chinese factory, poorly trained human resources, and the absence of good manufacturing practices all contributed to slow down technology transfer.

FPMM renegotiated the technology transfer agreement, and increased its share and control in the technology receiving company in August 1995. FPMM has put more efforts into modifying and upgrading the Chinese factory through rapid technology transfer.

FPMM is also injecting more advanced technology and upgrading the technology infrastructure on a continuous basis. The Chinese venture is very much dependent on FPMM's advanced technology.

Technology transfer required more resources and time than both of the parties could anticipate. However, quality of production has been achieved and the productivity of the workers is steadily increasing. The strong commitment on the part of the technology

supplier, the high demand for paper machines and low input costs made the project a success.

Company ERP system, Web, internal database, CD-ROM, e-mail, Internet, teleconferencing, and newsgroups are some of the ways in which the company currently promotes on the global marketplace.

6.3 Paper and Pulp Technology Supplier

This Finnish company is one of the global leaders in servicing the pulp and paper industry. It has transferred pulp and paper industry service technology to several advanced industrialized countries, such as the USA, Germany, France, and Japan, as well as to developing countries.

The company sustains its technology leadership position through heavy investment in R&D. The company has a very strong presence on western markets.

The company uses ERP, Web, e-mail, CD-ROM, database, mailing list, newsgroup and videoconferencing technology to execute its global electronic marketing communication. By investigating internal databases, paper industry-related market databases (external), and CD with market data, the company identified South East Asia (SEA) as an attractive market. In order to satisfy local demand in SEA and to strengthen its position on the marketplace, the company wanted to establish a full-service technology center at a favorable location in SEA. Through a feasibility study, Thailand was identified as the most favorable location.

The company negotiated with a local authority in the region by exhibiting the importance of the technology for that area and establishing its own subsidiary in 1996. Expatriates from Finland are employed in the local organization.

The technologies transferred from Finland were specifically for paper machine roll coverings and coatings, engineering know-how and business control systems and practices. These are cutting-edge technologies, and were adapted according to the needs of the SEA market. Technology was partially legally protected and a very high percentage of the technologies were tacit and difficult to document.

The technology was transmitted through the provision of documents and intensive training. The Finnish company trained mainly managers, engineers and shop floor technicians. At the first

stage, the training was carried out in Finland and the USA. Later, the Finnish company sent four experts to provide training in technical, managerial and marketing areas to local Thai employees. The expatriate managers also provide training to their subordinates. The expatriates' responsibilities are for marketing/sales/customer support and manufacturing operations. The plant provides specialized technical support, roll services and spare parts for the pulp and paper industry.

The low standard of education, lack of infrastructure, poor data communication skills, cultural differences and currency devaluation have made technology transfer slow.

Local consulting companies were utilized, with help from the Finnish Embassy in Thailand. The technology supplier is continuously transferring technology that is more advanced to its SEA site. This ensures quality.

The continual upgrading of technology, high performance technology and strong commitment from the technology supplier made the project a success.

6.4 An Elevator and Escalator Manufacturer

The Finnish elevator and escalator manufacturer (FEEM) is one of the world leaders in manufacturing, installation, maintenance and modernization of elevators and escalators. It relentlessly upgrades its technology through high investment in R&D.

It has transferred technology to Western Europe, North America as well as to developing countries around the world. Mainly, due to the maturing of its traditional markets in Western Europe and North America, and increased global competition, FEEM was looking for opportunities on emerging markets.

The company uses ERP, Web, e-mail, database, mailing list, newsgroup and teleconferencing technology to execute its global electronic marketing communication. By investigating company internal databases, country and elevator-related market databases (external), and CD with market data, FEEM identified India as an attractive market. The large size of the market, economic reform, and steady growth were the key factors in identifying India as a prospective country for ITT. FEEM made feasibility studies to evaluate technology

transfer to India. It made a promotion targeted at India.

One prospective technology recipient from India made inquiries to FEEM through a Finnish industrial development fund (FIDF). The Indian technology recipient had experience in the manufacture, erection and maintenance of certain types of lifts. Increased competition on the Indian market, a shortage of funds, and lack of R&D facilities and modern technology, motivated the prospective technology recipient to approach FEEM.

Possession of critical technology gave FEEM bargaining power. In 1984, it negotiated a favorable technology transfer contract. It used the telephone, fax, and express mail for preliminary negotiations, and face-to-face meetings for final negotiation. Due to the underdevelopment of IT at that time in the Indian company, FEC has not been able to use IT to the fullest potential to conduct primary market research.

It made a license and technical assistance agreement as well as other agreements, such as one on confidentiality with individual employees in the JV. FEEM contributed technology and owned part of the new company, while FIDF invested money in the new venture.

The technology was a combination of product know-how, process know-how, operation know-how and management know-how. Some parts are legally protected through patents. FEEM arranged training for Indian managers and engineers in Finland and other Western countries. They opened a new factory at the beginning of 1987 in India. After receiving training, a few engineers left the company since they were offered higher salaries by other companies. However, FEEM's technology is vast and involves such a wide spectrum of activities that no single person can absorb it all. Due to a weak telecommunication infrastructure, long distances and cultural differences, the technology transfer became slow.

The Indian partner managed the technology receiving organization, but ran into various difficulties from the beginning and started lose money. FEEM took a long-term approach, and gradually FEEM bought all the shares from the Indian partner. The situation did not improve dramatically, mainly due to market uncertainty and conflicts with labor unions.

The technological contribution is a crucial element of the growth and profitability of the technology receiving organization. The continuous absorption of advanced technology ensures a recipient's survival.

FEEM upgrades its technology effectively; participates in managerial and human resource training operations; it uses incentives, and socialization to make ITT effective. Due to the very active role of FEEM, reform of the Indian economy and improvement of certain laws and regulations, the ITT project has become profitable.

The company has been using such tools as ERP, Web, e-mail, database, mailing list, newsgroup and teleconferencing technology to perform global electronic communication.

A comparative case analysis was used in these four cases to identify and delineate the components of the EIP process. The findings from the above cases were compared, patterns were identified and a preliminary model for the EIP process was developed. Several iterations of the frameworks have been made in order to refine and simplify them in this research project. Then the causes of failure of these cases were identified by investigating several companies and recommendation strategies were proposed.

7. Developing A Model of An IT-enabled IP Process

A framework has been developed through several in-depth interviews of researchers in an ITT research project group and ITT practitioners, through investigations of previous research on ITT and a literature review in the field of ITT and IT, and by analysis of the case companies.

A review of current literature and empirical research suggest that IEP can radically change the way international promotion is conducted and can create high impacts. This study contends that to make IP more efficient and effective it should be considered and executed as a process. The study suggests that IP in an electronic environment can be conceptualized as a process of six interlinked activities (see Figure 2) which are usually executed in chronological order. Through the IEP process, the technology supplier interacts with the technology receiver, information flows in both directions, money is paid to the supplier and the "market offerings" are delivered from the technology supplier to the technology recipient.

The model is suitable for promoting market offerings (i.e. technology, equipment, component, part and services) globally. According to the capacities of each tool, each has been placed in the box to which category it belongs. For example, conferencing technologies have negotiation capabilities, while most of the other tools do not have these capacities. The ITs can be implemented in two or more stages, and it will be cheaper for the organization and easier to implement. At the first stage, it could utilize a few IT tools and network services (Web, e-mail, signature file, mailing list, trade mailing list, newsgroup, electronic magazine, electronic press release, teleconferencing). Before implementation of the first stage, the enterprise should examine its scope (supplying capacity, availability of funds for promotion, etc.), determine the goals of promotion, arrange e-mail translation, establish after-sales support in the languages of the countries that they are targeting, arrange online international payment and international logistics facilities, and develop the required information systems. At the beginning of the first stage the enterprise could develop a multilingual Web site, including many pages in English and a few pages in Spanish and French since many enterprises from developing countries are fluent in those languages. The enterprise could then register its home page with foreign language search engines, indexes and make strategic links with other home pages. These links would attract customers from target countries to Spanish, French and English pages. More content could be added to each language on the site afterwards, and the site can diversify into other languages for example, Chinese and Russian since many companies from developing countries are also fluent in those languages.

While implementing the IEP stages, the person in charge of Web site promotion needs to be highly flexible in terms of the various techniques which have been mentioned earlier. S/he needs to evaluate what works best, and change the promotional plan accordingly. Testing and modification of the mix of promotional tools are needed to maximize Web site traffic. More emphasis should be put on those that work best.

Empirical research suggests that the costs of implementing IEP are much lower than those for conventional IP. Time scales for implementing the first stage may vary according to the scope of the promotion and its goals. The first stage can be implemented within four months. The enterprise should train the marketer to utilize the model effectively and

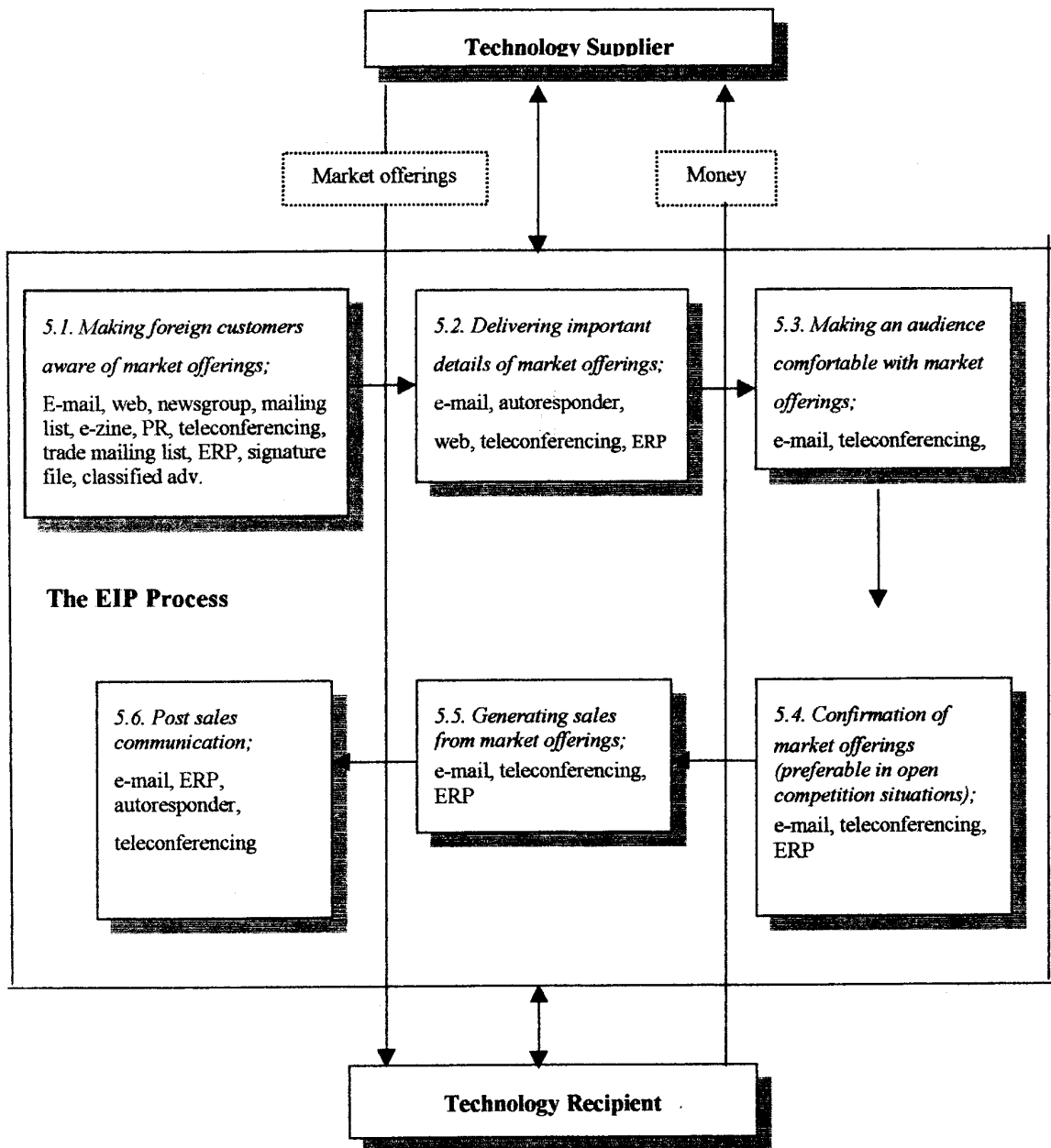


Figure 2. IT-enabled International Promotion Process (Stage 1)

efficiently as well as to make some adjustments according to the scope of the enterprise and the particular market to be promoted.

Once the first stage has been implemented successfully it should then implement the other advanced IT tools and network services (extranet, multimedia Web, electronic exhibition, Webcasting, banner advertising, CD-ROM, DVD, software agent and video mail). In this Section, ITs for the first stage have been integrated and systematically executed.

7.1 Making Foreign Customers Aware of Market Offerings

Through international market research the enterprise should identify potential technology recipients on the target markets. It can send 2-3 e-mails one after another at intervals to identified enterprises with the goal of generating technology licensing and/or other engagements. As not all enterprises in developing countries are yet Internet oriented, the same message should be sent by fax or post to all prospective technology recipients. High awareness can be created and market offerings and company

information to target markets can be spread by launching a highly informative and comprehensive catalogue by the ERP connected to the Internet, posting problem solving messages to newsgroups and mailing lists, publishing articles in e-zines, conducting teleconferencing, arranging public releases, posting buy/sell offers to trade sites on WWW and trade mailing lists, adding signature files to messages and articles, putting classified advertisements on network services and in e-zines, as well as adding Web site URL/e-mail addresses to conventional advertisements and press releases, envelopes, letterheads, brochures, catalogues, and business cards.

7.2 Delivering Important Details of Market Offerings

A company can send additional details through e-mail as well as by normal mail to those prospective customers who request more information. Customers can obtain detailed information on the benefits and features of market offerings and the enterprise, etc. by forwarding e-mail to autoresponders and checking the comprehensive catalogue produced by ERP at their convenience. In the case of very customized information needs, the enterprise can participate in teleconferencing with potential customers.

7.3 Making An Audience Comfortable With Market Offerings

After completion of the second step, the enterprise can remind customers through e-mail of the unique capacities for customer satisfaction provided by the enterprise's market offerings. At the same time, the enterprise can participate in teleconferencing with potential customers and through questioning and answering methods show that the offerings satisfy customers needs. After reading electronic press releases the customer may have a more positive attitude towards the enterprise. Also the enterprise should register itself with various organizations, for example with the World Trade Center, Dun and Bradstreet, etc. in order to enhance its trust to foreign customers.

7.4 Confirmation of Market Offerings (Preferable in Open Competition Situations)

The enterprise can inform potential customers how the features of market offerings, price, delivery, etc. are superior to competing market offerings through e-mail and teleconferencing.

Customers could check the catalogues produced by ERP, collect a huge amount of information, and check the inventories and order process in real time. This would create huge convenience for the customers. The company would reach global customers at low cost, offer its market offerings and inventories 24 hours a day, and make the sales process automated and highly cost-efficient.

7.5 Generating Sales From Market Offerings

A company can exhibit the unique benefits of its market offerings through e-mail and stimulate the desire to buy, ask for the order through teleconferencing and also deal with customer objections and negotiate. If the market offerings are complex e-mail and files transfer can be used heavily to conduct preliminary negotiations very cost efficiently, which in turn shortens the negotiation period, reduces travelling needs as well as reduces the negotiation expenses. Customers could process the order supported by the ERP at their most convenient time.

7.6 Post Sales Communication

Following the sale, the enterprise should ask the buyer whether the market offerings have satisfied his needs, whether any problem has arisen from the transaction, etc. through e-mail. This will increase the peace of mind of the buyer and s/he can be sure that s/he made the right buying decision. Providing additional information and problem solving advice by autoresponder and teleconferencing and supplying customer after sales service-related information through ERP can increase customer loyalty. These follow up communications will bring bigger business for the enterprise.

After evaluating the results of the first stage, the enterprise can start implement some of the tools such as the Extranet, multimedia Web, electronic exhibition, Webcasting, banner-advertising, CD-ROM, DVD, software agent

and video mail. The enterprise can add extra pages in other languages (for example in Chinese or Russian) and at the same time it can increase the content of earlier pages.

Launching a highly informative and rich multimedia Web and multimedia Webcasting, arranging electronic exhibitions, and installing banner advertisements will increase awareness of the enterprise and its market offerings. Customers can obtain in-depth information on market offerings from CD-ROM and DVD delivered by the enterprise. Enterprises can provide additional information and presentations through video mail. The enterprise can remind customers through video mail of the unique capacities for customer satisfaction provided by the enterprise's market offerings.

Using video mail, a software agent, teleconferencing and videoconferencing technology the enterprise can better inform the potential customers of the superior features, price, delivery, etc. in relation to the competitors' market offerings. Video mail and videoconferencing could stimulate the desire to buy and help in asking for quotations, dealing with customer objections, and negotiating. Videoconferencing, CD-ROM, DVD and Extranet can also help in problem solving and provide additional information.

Substitute IT tools for conventional tools: This study and our long involvement in this research area have helped us to develop Table 1. It exhibits the substitute IT tools for conventional tools.

Table 1. Substitute IT Tools for Conventional Tools

Conventional promotional tools	IT tools for IEP
International direct mail	E-mail, Video mail
Catalogue exhibition, Trade show, International advertising, Public relations	Enterprise resource planning (ERP), Multimedia Web, Banner advertising, Extranet, Electronic press release (EPR), Electronic exhibition/virtual trade fair
Trade mission, International personal selling	Teleconferencing, Videoconferencing

8. Causes of Failure in International Electronic Promotion

Multimedia is different from conventional promotional media. Our empirical research suggests that companies frequently fail in their international electronic promotion efforts for the following reasons:

1. There is a lack of an effective online international promotional framework.
2. Online marketers cannot differentiate their Web existence among several million Web pages.
3. Due to a lack of visual contact, buyers cannot see the market offerings or the employees of the supplier and cannot trust the supplier.
4. Enterprises do not put continuous efforts into online promotion. Web pages are made with the hope that some out of several million Web surfers will visit the site.
5. They are not aware of the strengths and weaknesses as well as the strategies for successful use of various new electronic promotional tools.
6. The Web site has not been effectively promoted in the right locations in the Internet where the potential customers are. In addition, the site may not be sufficiently promoted off-line.
7. The message of the Web is unclear, words are not compelling enough to generate sales.
8. The site is too graphical and visitors are inconvenienced by the slowness of downloading.
9. The information on the Web may not be comprehensive for prospective customers.

10. Prospective customers may not reach the company due to invalid URLs, invalid e-mail addresses and broken Web links.

The above list is not exhaustive. Different international promotional efforts face unique risks. The promotional manager should investigate and identify risks related to his/her own international promotional efforts beforehand.

9. Conclusions and Implications

This study introduces a new ERP-integrated IEP methodology, which can systematically guide companies to execute international promotion and facilitate rapid access to foreign markets. This study contributes in terms of both theory and practice:

1. At the theoretical level, it provides a model of an IT-enabled ITT promotion process, which can be used as a framework for further research.
2. At the practical level, the model can guide managers in promoting technology for international technology transfer and implementation effectively and efficiently.

Due to rapid changes in technology, shortening of technology and product life cycles, maturation of the market and increased competition, growing affluence and liberalization of the newly industrialized and developing country markets, hi-tech companies are trying to gain access to these markets through technology transfer.

In order to inform prospective foreign recipients of the availability of the technology, and to persuade them to opt for the technology-marketer's offer, proactive international promotion is needed. Due to complex and intangible nature of the technology, and different needs of prospective recipients, promotion of ITT through the utilization of conventional promotion tools may not be suitable, inexpensive and affordable to several companies.

ERP has promotional capabilities, that is, producing and exhibiting a comprehensive catalogue, delivering information required by prospective customers, letting customers check the inventory in real time, letting customers

process the order and so on. Although ERP has promotional capability, no research has been done till today on how it could support the promotion of technology transfer. An in-depth literature review suggests that a very limited literature exists on IT-enabled IP of technology transfer for companies.

This research has been undertaken considering the capabilities of ERP and other new ITs, and the need for international promotion of technology transfer. In order to fill up the gap in the literature and contribute to new knowledge, the in-depth study of IT-enabled international promotion process has been undertaken. The major objective of this research was to develop a systematic framework for the IEP process and to fill the gap in our knowledge about the current, as well as the potential uses of ITs in the IEP.

This study began with a literature review of printed and digitized resources (databases of journals, Internet resources, etc.). In-depth interviews with companies, practitioners and researchers were then conducted.

Theoretical and empirical investigation, analysis of the case companies have led us to the development of a model of ERP-integrated IEP process. The ERP-integrated IEP process consists of six phases: making foreign customers aware of market offerings, delivering important details of market offerings, making an audience comfortable with market offerings, confirmation of market offerings (preferable in open competition situations), generating sales from market offerings and post sales communication.

This study contends that by utilizing new ITs, complex conventional IP process can be almost replaced by a less complex ERP-integrated IEP process which can facilitate ITT.

If the prospective technology supplier is an SME, it could use fewer IT tools and services for promotion of ITT in the beginning and obtain desired benefits. The existing IT infrastructure needs to be extended through integrating other IT tools as the enterprise grows. The integration of the enterprise's existing information systems with the Extranet, Intranet, multimedia based computer simulation software, push technology, multimedia teleconferencing, Internet robots, and other IT tools can develop the required IT infrastructure for more efficient and effective IP process than the conventional IP process.

9.1 Implications for Managers

This study offered a methodology of how to execute IT-enabled IP effectively and efficiently, avoiding problems. The study is important for current and future IT and for technology-driven international/global business environment.

Companies are challenged to internationalize due to rapid shortening of technology and product life cycles and intensified competition on their domestic markets. Therefore, the study of competitive advantages of companies through IT-enabled IP is essential.

In order to survive on an intensely competitive marketplace, companies are trying to implement ITs in their IP efforts. Therefore, it is very important for companies to gain an in-depth understanding of the factors that have an impact on their performance. The result of this research is very useful in providing such in-depth understanding. We were able to uncover how companies can effectively utilize new ITs in their IP efforts. We also demonstrated how companies could be successful in IP and overcome the lack of success in achieving benefits to date.

This study provides organizations with a more comprehensive picture of what actually happens in the IT-enabled IP process. Companies can obtain their intended benefits from the IT-enabled IP process model via the addition of new ITs. Effective utilization of IT-enabled IP methodology can provide the following benefits:

- increased awareness of the enterprises and their market offerings (technologies and/or products and/or services) substantially on the foreign markets
- rapid generation of leads
- faster and easier sales
- decrease in promotional expenses
- increase in promotional capacity
- new markets openings
- internationalization through IT-enabled promotion of ITT.

Our empirical findings show that there are very high possibilities of companies running into the associated risks of IEP. In order to become successful in IEP and in a highly competitive and complex global business environment, companies should:

1. Identify their target audience through effective international market research. Companies should also do ongoing international market research, as the present global business environment has become highly complex with rapid and unexpected changes occurring often.
2. Identify problems and risks at the inception stage of the IEP process and make plans to eliminate problems and reduce risks.
3. Develop a comprehensive catalogue by means of ERP and integrate it with the Internet. It should be user-friendly in locating the required information, rich in content, lower level in terms of graphics and culturally friendly. Links should be established and promoted intensively on- and off-line.
4. Combine many IT tools and use them innovatively, systematically, intensively and in an integrated manner every day.
5. Focus on understanding customers' specific requirements and communicate such understanding to customers through all IT tools.
6. Frequently provide problem solving advice to those newsgroups, mailing lists, I-digests, etc. where the enterprise's potential and present customers are located in order to increase visibility and to build credibility.
7. FAQ could be delivered through ERP.
8. Offer informative articles through autoresponders, publishing in e-magazines, storing at Web sites and other locations to develop the credibility and establish the enterprises as experts.
9. Enclose their URLs, e-mail addresses, autoresponders to business cards, letterheads, envelopes, brochures, catalogues, and magazine advertisements.

10. Register themselves with various organizations, for example with the World Trade Center, Dun and Bradstreet etc. and arrange payment mechanisms through the world's leading financial transaction firms.
11. Focus on communicating risk-free buying, secure payment, secure privacy and develop brand name credibility.

The above list is not exhaustive. Managers must be very open and flexible individuals possessing foresight and long term thinking capacity. In this way the managers must try to adapt tactics and strategies to deal with a constantly changing environment.

9.2 Future Research Directions

This research delivered an IT-enabled IP process model, which can be used as a basis for further research in the ITT field. Future empirical and conceptual research will be helpful in further refining the model.

The IT-enabled IP process model is composed of six interlinked phases which are: making foreign customers aware of market offerings, delivering important details of market offerings, making an audience comfortable with market offerings, confirmation of market offerings (preferable in open competition situations), generating sales from market offerings, and post sales communication. Each of these phases needs to be developed through further research.

Hi-tech companies are using a type variety of ITs in their various stages of ITT promotion in order to make the technology transfer promotion process more efficient and effective. IT will be able to play even a greater role in promoting the technology in the future. It is important to investigate what are the most effective promotional tools in global electronic environment, e.g. in-depth research is necessary to find out how the utilization of advanced conferencing technologies could be increased for effective global promotion.

Our framework was developed on the basis of few case companies where technology has been transferred from Finland to emerging markets and developing countries. It is necessary to examine its validity also in other situations. Because this framework was developed from the technology supplier's perspective, it could be interesting to examine from the technology

recipient's perspective, the factors that are influencing on the promotional process and the critical success factors of the IT-enabled IP process.

Acknowledgment

We would like to extend our thanks to all the interviewees who participated in this study for their cooperation.

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